

WHAT IS CLAIMED IS:

SUB B1

1. A treated manganese ore for use in producing manganese sulfate therefrom, said treated ore having a degree of manganese dissolution of 98.0% by weight or higher based on the manganese contained in the treated manganese ore when dissolved in sulfuric acid.

2. The treated manganese ore of claim 1, which has a degree of iron dissolution of 70% by weight or higher based on the iron contained in the treated manganese ore when dissolved in sulfuric acid.

SUB a1

3. The treated manganese ore of claim 1, wherein the ratio of the amount of potassium soluble in sulfuric acid to that of manganese contained in the treated manganese ore (K/Mn) by weight is 0.001 or lower.

4. The treated manganese ore of claim 1, which is one obtained by bringing a manganese ore into contact with a reducing gas at a temperature of from 400 to 790°C.

SUB B3

5. A treated manganese ore obtained by immersing the treated manganese ore of claim 4 in water having a temperature of from 70°C to the boiling point thereof as measured at atmospheric pressure.

6. The treated manganese ore of claim 1 or 5, which has a particle size of 500 μ m or smaller.

SUB a2

7. A process for producing the treated manganese ore for use in producing manganese sulfate therefrom, said treated ore having a degree of manganese dissolution of 98.0% by weight or higher based on the manganese contained in the treated

Sub a2
manganese ore when dissolved in sulfuric acid, which comprises bringing a manganese ore into contacted with a reducing gas at a temperature of from 400 to 790°C to obtain a reduced ore.

Sub B5
8. The process for producing a treated manganese ore of claim 7, wherein the manganese ore is pulverized to a particle size of 500 μ m or smaller before the reduced ore is obtained therefrom.

Sub a3
9. The process for producing a treated manganese ore of claim 7, wherein the manganese ore is kept in contact with the reducing gas at a temperature of from 400 to 790°C for a period not shorter than the reduction saturation time.

10. A process for producing the treated manganese ore for use in producing manganese sulfate therefrom, said treated ore having a degree of manganese dissolution of 98.0% by weight or higher based on the manganese contained in the treated manganese ore when dissolved in sulfuric acid, which comprises bringing a manganese ore into contacted with a reducing gas at a temperature of from 400 to 790°C to obtain a reduced ore, and the reduced ore obtained is immersed in water having a temperature of from 70°C to the boiling point thereof as measured at atmospheric pressure.

11. The process for producing a treated manganese ore of claim 10, wherein the reduced ore obtained is immersed in water having a temperature of from 70°C to the boiling point thereof as measured at atmospheric pressure, and washed.

12. The process for producing a treated manganese ore of claim 10, wherein the reduced ore obtained is immersed in

SVB 93
water having a temperature of from 70°C to the boiling point thereof as measured at atmospheric pressure, washed and filtered.

13. The process for producing a treated manganese ore of claim 7, wherein the reducing gas comprises one or more members selected from the group consisting of hydrogen, carbon monoxide, sulfur dioxide, hydrogen sulfide, and methane.

14. The process for producing a treated manganese ore of claim 7, wherein the reducing gas is used in an amount of from 1.0 to 2.0 times the theoretical amount thereof necessary for the reduction of the manganese ore.

SVB 94
15. The process for producing a treated manganese ore of claim 13, wherein the reducing gas is one obtained by diluting said reducing gas with an inert gas.

SVB 95
16. The process for producing a treated manganese ore of claim 7, wherein the time period of the contact of the reducing gas with the manganese ore is from 20 to 120 minutes.

SVB 96
17. The process for producing a treated manganese ore of claim 7, wherein the contact of the reducing gas with the manganese ore is conducted continuously with a rotary kiln.

SVB 97
18. The process for producing a treated manganese ore of claim 17, wherein the rotary kiln has a cylindrical or prismatic shape.

SVB 98
19. The process for producing a treated manganese ore of claim 17, wherein the rotary kiln is equipped with a device for mixing the ore with the reducing gas.

20. The process for producing a treated manganese ore of claim 19, wherein the device for mixing the ore with the

reducing gas comprises one or more movable stirring blades installed in the kiln or one or more stirring blades fixed to the inner wall of the kiln.

21. The process for producing a treated manganese ore of claim 7, which is conducted continuously.

22. The process for producing a treated manganese ore of claim 8, which is conducted continuously.

23. The process for producing a treated manganese ore of claim 10, which is conducted continuously.

24. The process for producing a treated manganese ore of claim 10, wherein the reduced ore is cooled in a nonoxidizing atmosphere and then immersed in water.

25. The process for producing a treated manganese ore of claim 10, wherein the reduced ore is immersed in water and then cooled in a nonoxidizing atmosphere.

26. The process for producing a treated manganese ore of claim 24, wherein the cooling is conducted continuously.

27. The process for producing a treated manganese ore of claim 25, wherein the cooling is conducted continuously.

28. The process for producing a treated manganese ore of claim 10, wherein the immersion of the reduced ore in water is conducted so as to yield a slurry in which the concentration of the reduced ore is from 10 to 40% by weight.

29. The process for producing a treated manganese ore of claim 10, wherein the immersion of the reduced ore in water is conducted for a period of from 1 to 24 hours.

30. The process for producing a treated manganese ore

SUB B13
of claim 10, wherein the immersion of the reduced ore in water is conducted in one or more stirring tanks for continuous processing.

31. Electrolytic manganese dioxide for use in batteries which is obtained by dissolving the treated manganese ore of claim 1 or 5 in sulfuric acid, purifying the resultant solution, and electrolytically oxidizing the resultant manganese sulfate.

SUB B99
32. A process for producing electrolytic manganese dioxide which comprises adding sulfuric acid to the treated manganese ore of claim 1 or 5 to dissolve the ore and thereby obtain an aqueous solution of manganese sulfate, purifying the resultant aqueous solution of manganese sulfate, and then subjecting the solution to electrolytic oxidation to oxidize the manganese sulfate.

33. A process for producing electrolytic manganese dioxide which comprises obtaining a treated manganese ore by the process of claim 7, adding sulfuric acid to the treated manganese ore to dissolve the ore and thereby obtain an aqueous solution of manganese sulfate, purifying the resultant aqueous solution of manganese sulfate, and then subjecting the solution to electrolytic oxidation to oxidize the manganese sulfate.

Add a8

Add C2